

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>PION.2.PCT</b>	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. <b>PCT/US2004/024724</b>	International filing date (day/month/year) <b>30/07/2004</b>	(Earliest) Priority Date (day/month/year) <b>08/08/2003</b>
Applicant <b>PIONETICS, INC.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

#### 1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐

The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. ☐

With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐

**Certain claims were found unsearchable** (See Box II).

3. ☐

**Unity of invention is lacking** (see Box III).

4. With regard to the **title**,

☒

the text is approved as submitted by the applicant.

☐

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐

the text is approved as submitted by the applicant.

☒

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regards to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☒

as suggested by the applicant.

☐

as selected by this Authority, because the applicant failed to suggest a figure.

☐

as selected by this Authority, because this figure better characterizes the invention.

b. ☐

none of the figures is to be published with the abstract.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2004/024724

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

An apparatus (20) treats an influent solution (70) comprising ions to obtain a selectable ion concentration in an effluent solution (80). The apparatus (20) comprises an electrochemical cell (22) comprising a housing (25) comprising first and second electrodes (40,45). A water-splitting ion exchange membrane (100) is between the first and second electrodes (40,45), the membrane (100) comprising an anion exchange surface (46) facing the first electrode (40), and an cation exchange surface (48) facing the second electrode (45), or vice versa.

The housing (25) also has an influent solution inlet (30) and an effluent solution outlet a (35) with a solution channel (52) that allows influent solution (70) to flow past both the anion and cation exchange surfaces (46,48) of the water-splitting ion exchange membrane (100) to form the effluent solution (80). A variable voltage supply (50) is capable of maintaining the first and second electrodes (40,45) at a plurality of different voltages during an ion exchange stage.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US2004/024724

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 02079098	A	10-10-2002	IT T020010314 A1 CA 2442767 A1 EP 1383711 A2 WO 02079098 A1	02-10-2002 10-10-2002 28-01-2004 10-10-2002
EP 0642824	A	15-03-1995	SK 99293 A3 CA 2129775 A1 EP 0642824 A1	12-04-1995 15-03-1995 15-03-1995
EP 1075868	A	14-02-2001	EP 1075868 A2 JP 2001113281 A SG 89344 A1 TW 510823 B US 6379518 B1	14-02-2001 24-04-2001 18-06-2002 21-11-2002 30-04-2002
CA 2228886	A	06-08-1999	CA 2228886 A1	06-08-1999
US 4925541	A	15-05-1990	US 4632745 A US RE35741 E DE 3568946 D1 EP 0170895 A2 JP 1782943 C JP 4072567 B JP 61107906 A US 4956071 A US 5154809 A	30-12-1986 10-03-1998 27-04-1989 12-02-1986 31-08-1993 18-11-1992 26-05-1986 11-09-1990 13-10-1992

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/024724

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C02F1/469 B01J47/08 B01J47/12 B01D61/44

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 C02F B01J B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/079098 A (ELTEK SPA ; FIORINI ANDREA (IT); GADINI CONSTANZO (IT)) 10 October 2002 (2002-10-10) page 4, line 14 - page 5, line 21 page 22, line 7 - page 23, line 14 figures 1,2	1-12
A	EP 0 642 824 A (MONTETITANO S A) 15 March 1995 (1995-03-15) the whole document	1-12
A	EP 1 075 868 A (KURITA WATER IND LTD) 14 February 2001 (2001-02-14) the whole document	1-12
A	CA 2 228 886 A (GLEGG WATER CONDITIONING INC) 6 August 1999 (1999-08-06) the whole document	1-12
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

\* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

29 November 2004

Date of mailing of the international search report

06/12/2004

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International Application No  
PCT/US2004/024724

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 925 541 A (GIUFFRIDA ANTHONY J ET AL) 15 May 1990 (1990-05-15) the whole document	1-12
A	ALLISON R P: "Electrodialysis reversal in water reuse applications" DESALINATION, ELSEVIER SCIENTIFIC PUBLISHING CO, AMSTERDAM, NL, vol. 103, no. 1, November 1995 (1995-11), pages 11-18, XP004019046 ISSN: 0011-9164 the whole document	1-12
A	KOCK K ET AL: "AUFBEREITUNG VON SALZBELASTETEN WASSERVORKOMMEN DURCH ELEKTRODIALYSE" GWF WASSER ABWASSER, OLDENBOURG VERLAG. MUNCHEN, DE, vol. 135, no. 2, 1 February 1994 (1994-02-01), pages 115-118, XP000424078 ISSN: 0016-3651 the whole document	1-12